

# **Causes and Consequences of a Cool, Dense Plasma Sheet Population in the Dawn Region During Intervals of High Geomagnetic Activity**

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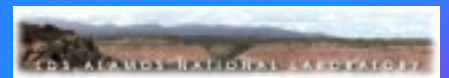
# Topics

- Database and data analysis technique.
- Average energy-time spectrograms.
- 1998 event study.
- FAST conjunction event: March 11, 1998.
- Summary of results.



## The Database

- Three Los Alamos geosynchronous satellites: 1990-095, 1991-080, and 1994-084.
- Magnetospheric Plasma Analyzer (MPA).
- Energy range:  $1 \text{ eV} \lesssim E_{p,e} \lesssim 40 \text{ keV}$ .
- Spin-averaged fluxes and moments.
- Years included: 1996, 1997, 1998.
- Number of 10-sec. measurements:  $\sim 1$  million / year.





# Data Analysis Technique

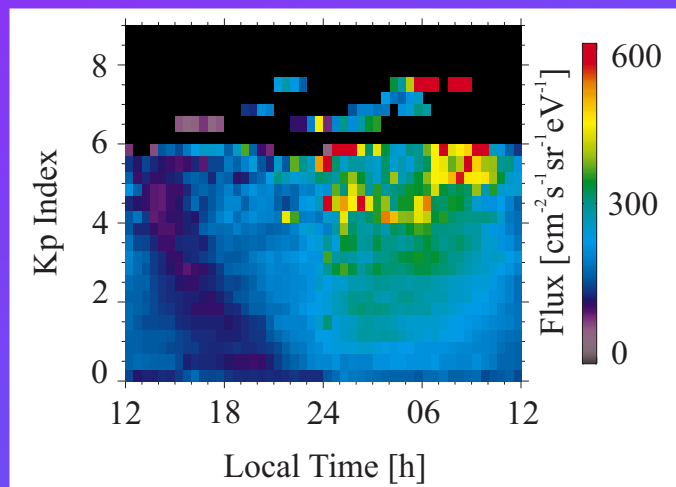
- Procedure:
  1. Median calculation for 0.5 hour interval of LT.
  2. Sorting of median values into bins according to LT and Kp.
  3. Average the median values in each LT-Kp bin.
- Magnetosheath and boundary layer intervals are excluded.

Valid data-point requirements:

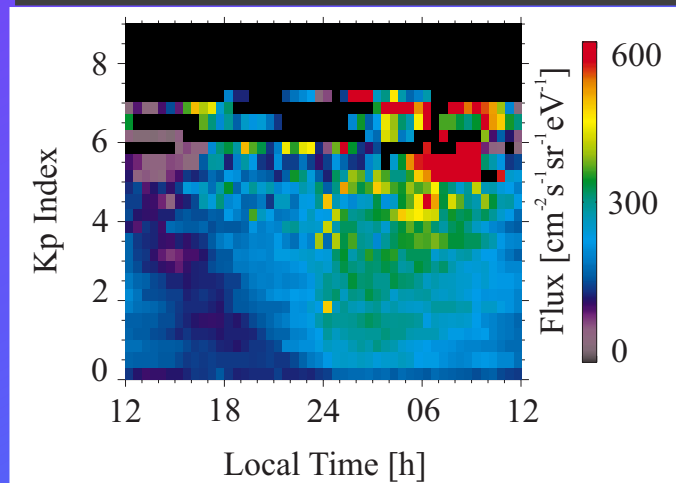
- Proton density:  $n_p < 3 \text{ cm}^{-3}$ .
- Proton temperature:  $T_p > 2000 \text{ eV}$ .



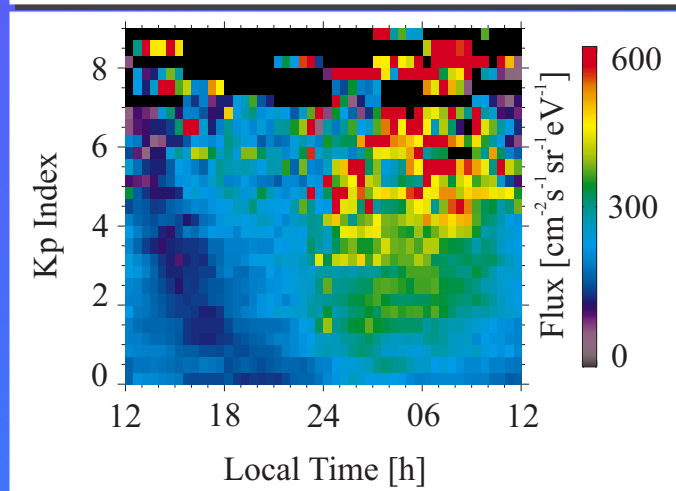
# Flux-Statistic for 1.0 keV Protons



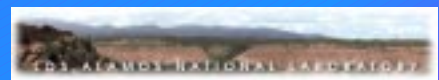
1996



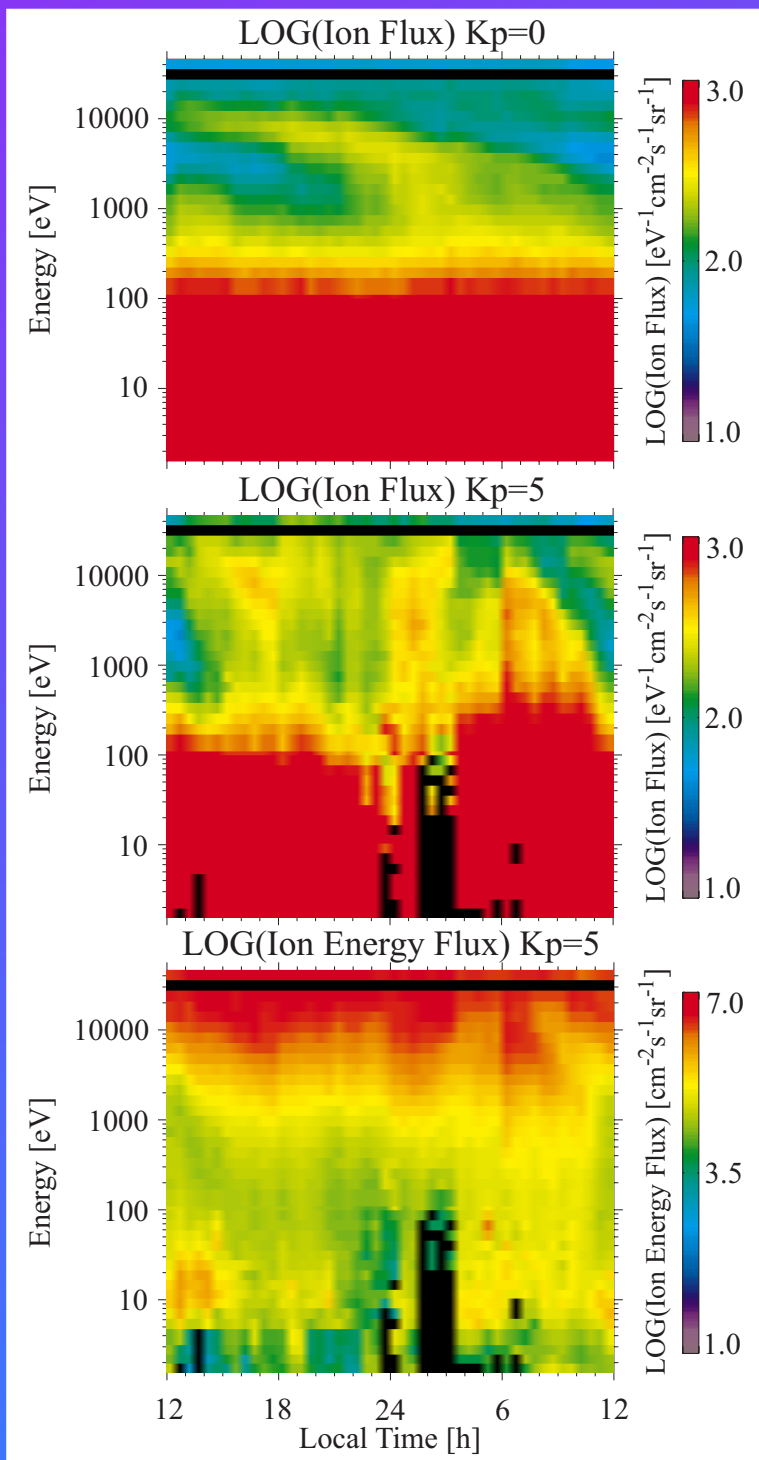
1997



1998

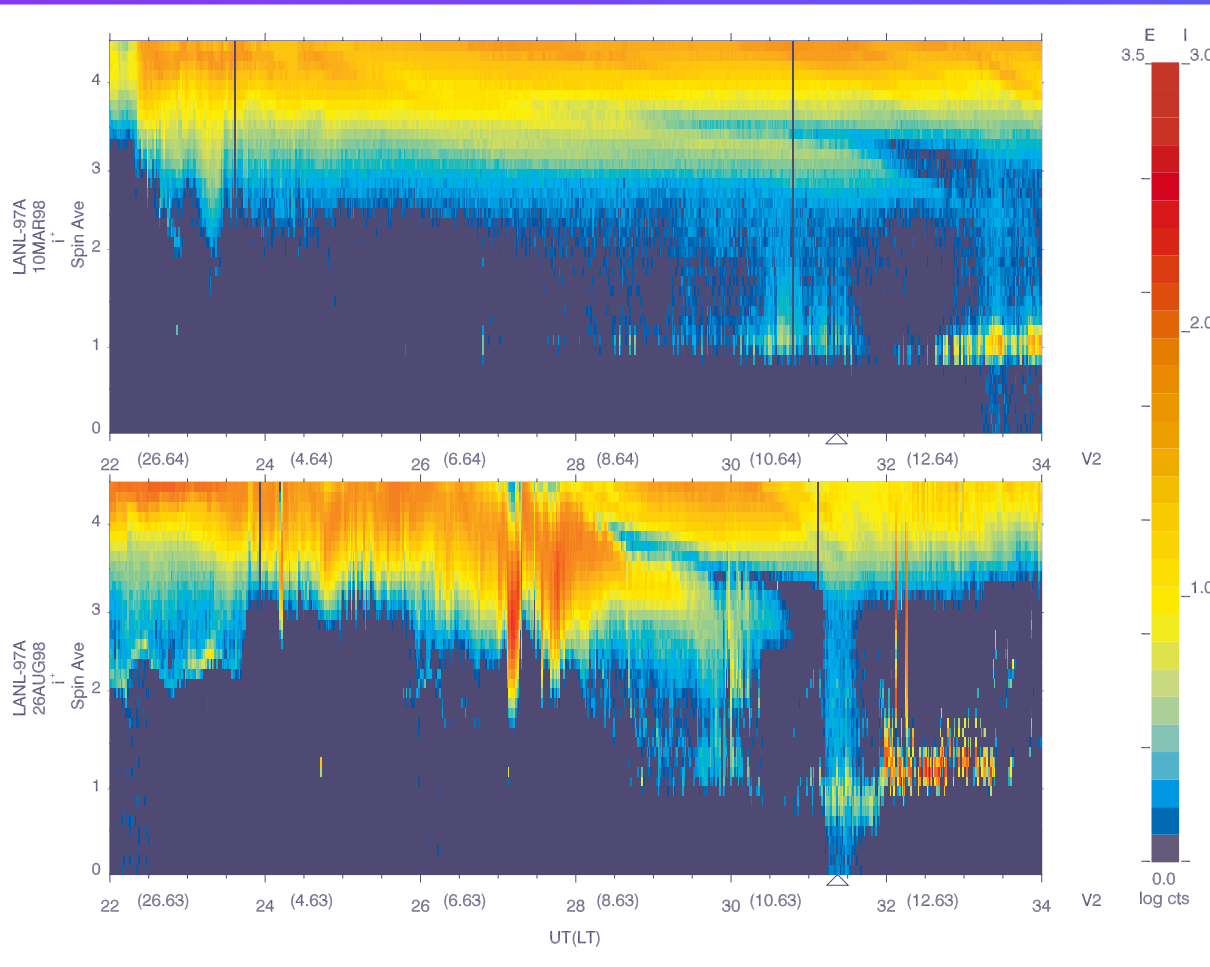


# Average Energy-Time-Spectrograms 1998



# Event Study 1998: Energy-Time Spectrograms

1



2

# of events:

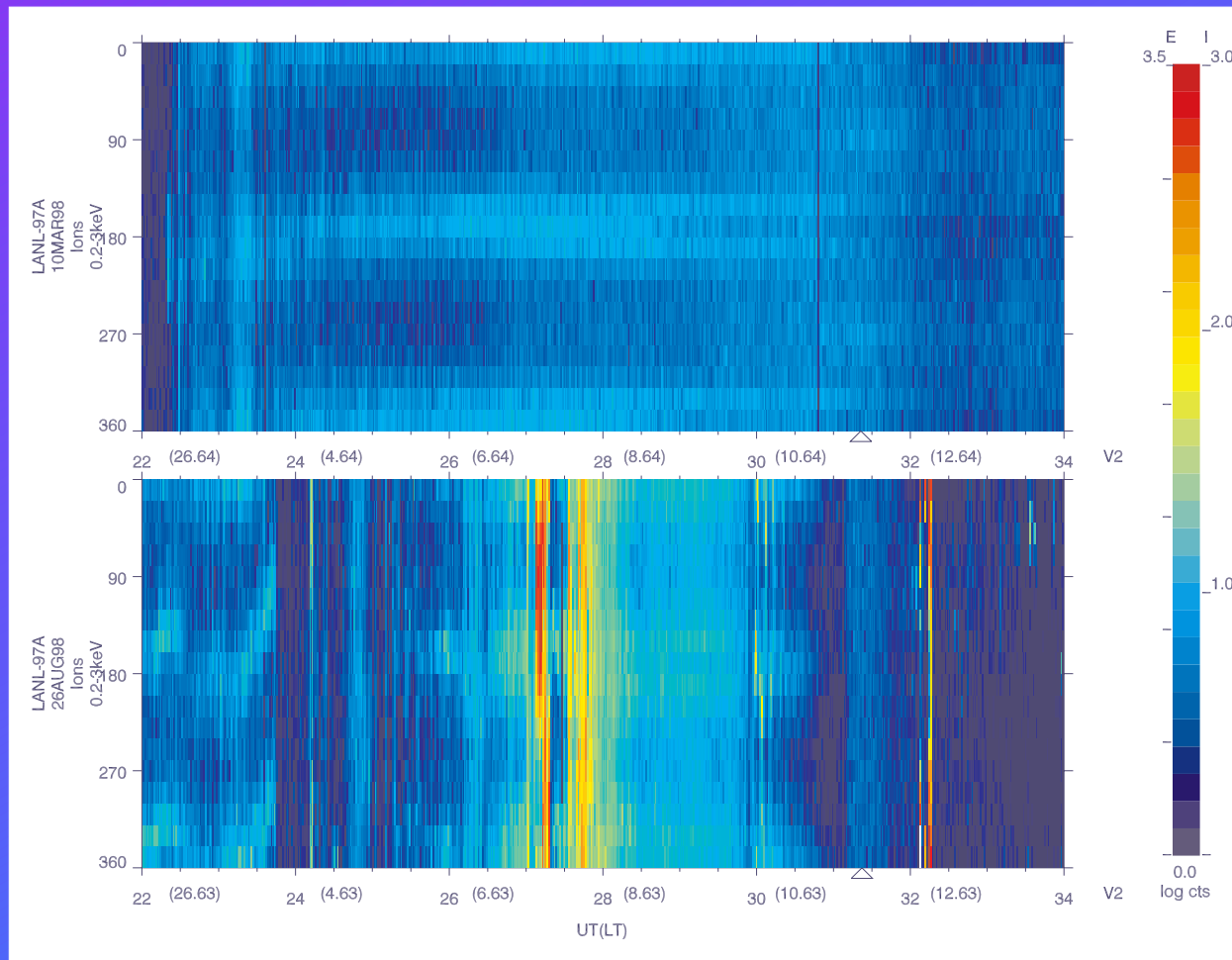
Type 1: 4

Type 2: 4

Unknown: 2

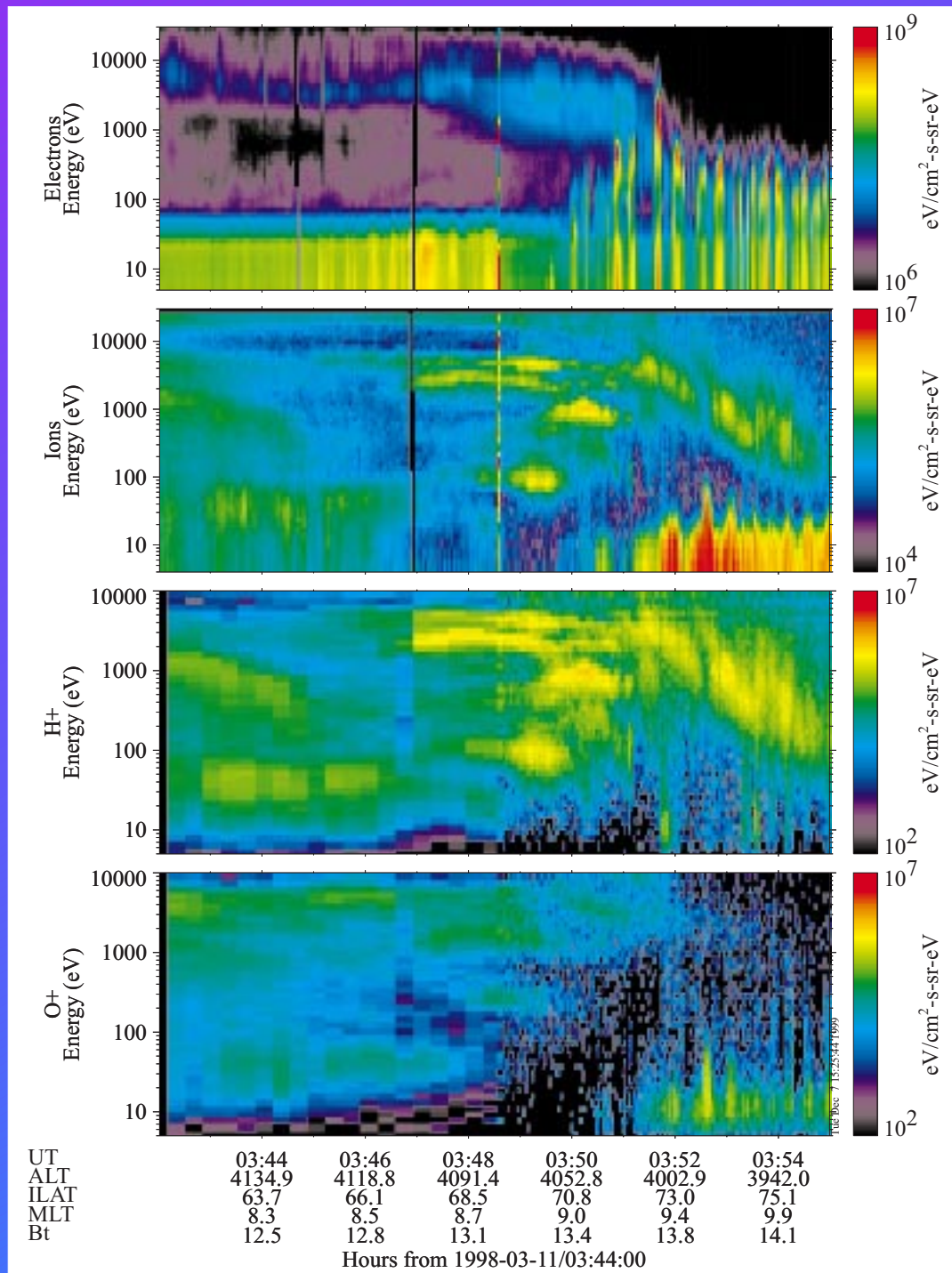


# Event Study 1998: Azimuth-Time Spectrograms

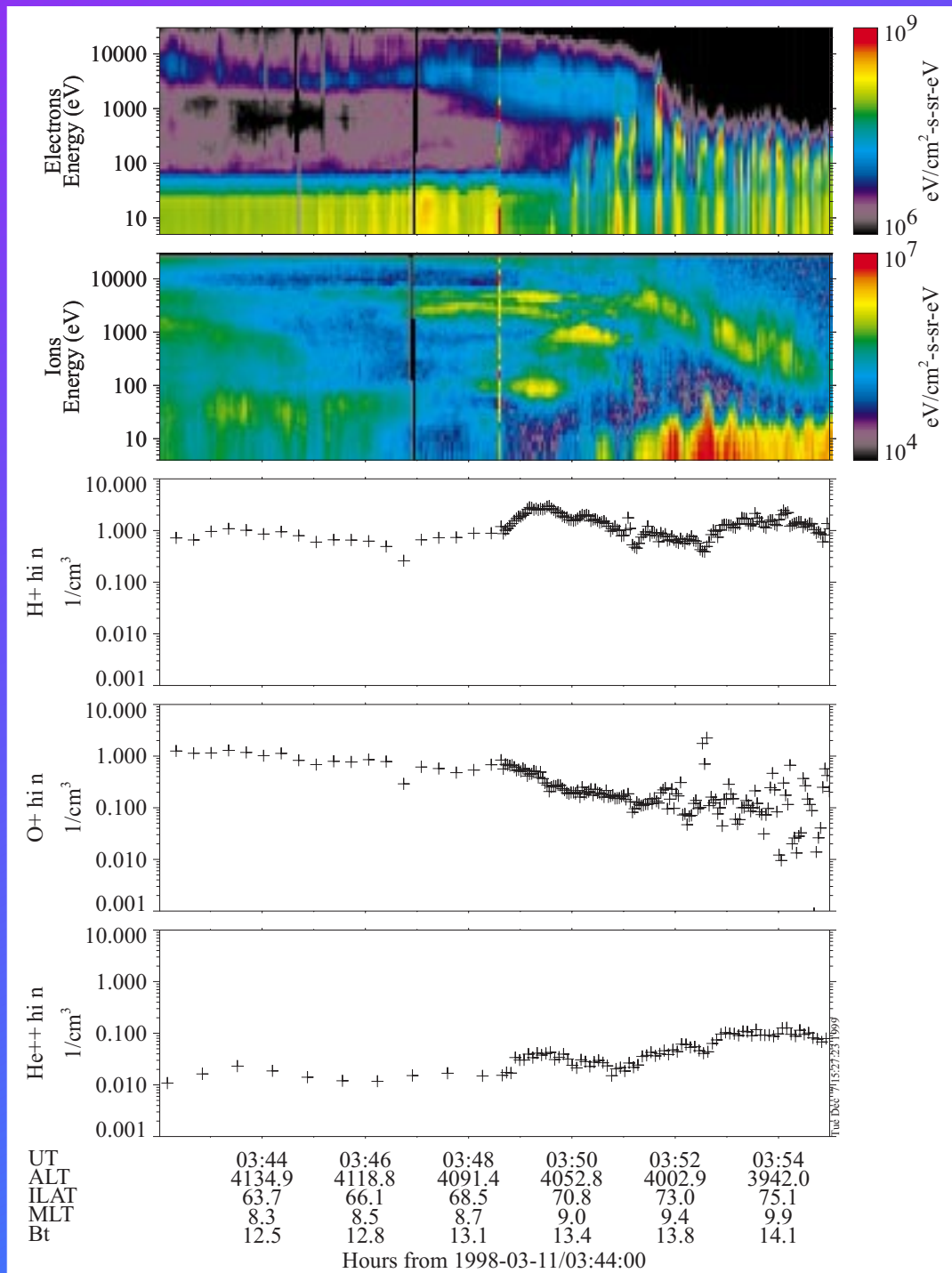




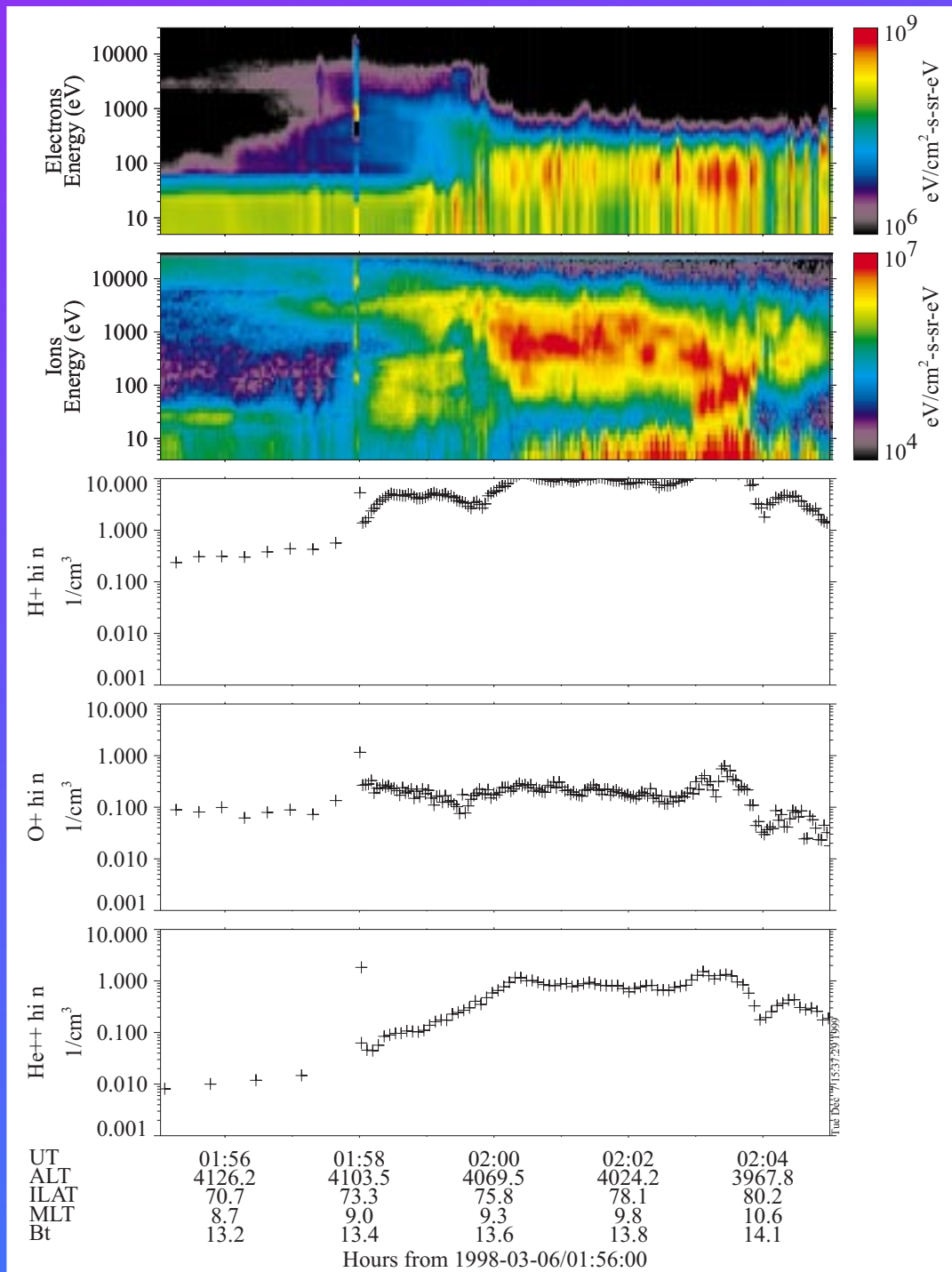
# FAST Data: March 11, 1998 (Active)



# FAST Data: March 11, 1998 (Active)



# FAST Data: March 6, 1998 (Normal)





## Summary of Results

- Average energy-time spectrograms show high fluxes in the 1 keV range in the dawn sector during times of high geomagnetic activity.
- The individual events contributing to the high average fluxes during these local times have different spectral qualities.
- Particle fluxes in this energy range are mainly field-aligned at geosynchronous orbit.
- The FAST composition data obtained during one of these events show indications for ionospheric origin of these particles:
  - $O^+$  density is  $\sim 10$  times higher than during times of normal activity.
  - $H^+$  density is 2-3 times higher than the solar wind  $H^+$  density contribution calculated from the measured ACE  $He^{++}/H^+$  ratio.
- No composition data available for the other types of events in this study.

